

Developing TILLING for Tomato

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UC Davis is developing induced chemical mutagenesis populations in tomato to evaluate using high-throughput screening of DNAs. This strategy was named, **Targeting Induced Local Lesions In Genomes** (TILLING). We have concentrated on optimizing material and methods for mutagenesis. We have compared the response of four different varieties of tomato (H1706, M82, VFNT Cherry, and E6203) to EMS and MNU. VFNT Cherry was the most tolerant to the both mutagens. In addition, its compact growth habit allows fruiting in a 1-inch pot, it is highly productive in greenhouse and field; resistant to TMV; has an indeterminate growth habit that allows easy propagation; its semi-glabrous stem allows easy identification of contaminants; and its strong cleistogamy prevents accidental outcrossing. Because of these qualities, it was chosen for development of the TILLING populations. By using our optimized EMS protocol we initiated production of two large scale EMS populations (3,000 –to the M3 seed level- and 9,000– to the M2 seed level). A double EMS – sequential treatment population of 3000+ is also being produced and the strategy for this approach will be explained. The mutation level in the genomes of these populations is being characterized. We have developed methods for pilot and production TILLING based on Illumina ultra-high throughput sequencing. These methods provide several advantages compared to the previously employed CEL1-LiCor analysis. The plans for a TILLING service to the community will be described.